

## OUR ASTRONOMICAL COLUMN.

COMET MOREHOUSE, 1908c.—A new ephemeris for comet 1908c, computed from the following elements and covering the period October 8 to December 7, is published by Herr Ebell in No. 4276 of the *Astronomische Nachrichten* (p. 61, October 9); these elements were calculated by Prof. Kobold, and appeared in No. 4275 of the same journal:—

$T = 1908 \text{ December } 25^{\text{h}} 81^{\text{m}} 16^{\text{s}}$  (M.T. Berlin).

$$\begin{aligned} \infty &= 171^{\circ} 39' 41'' \cdot 7 \\ \delta &= 103^{\circ} 11' 56'' \cdot 7 \\ i &= 140^{\circ} 11' 7'' \cdot 4 \end{aligned} \left. \begin{array}{l} \\ \\ \end{array} \right\} 1908^{\circ} 0$$

$$\log q = 9^{\circ} 975278$$

According to the new ephemeris, the comet will attain its greatest brightness on October 24, and will then be about 5.6 times as bright as when discovered.

From notes in the *Gazette astronomique* (No. 10, p. 78) we learn that the comet was seen with the naked eye by several observers, at Antwerp, on September 29, the estimated magnitude of the head being 6.2, whilst the tail was  $2^{\circ}$  in length.

On October 18, at 8 p.m., the comet was seen as a naked-eye object at Chiswick, whilst with a  $1\frac{1}{2}$ -inch opera-glass, magnifying three times, it was quite a good object on October 14 and 18, the direction of the tail being made out quite easily. Photographs taken at the Solar Physics Observatory, South Kensington, with the 36-inch reflector and the 6-inch Dallmeyer camera, show that the tail is a complex structure of some five or six streamers.

COMET TEMPEL-SWIFT, 1908d.—Observations of the apparent position of comet 1908d were made at the Nice Observatory on September 29 and 30 and October 2 and 3 by M. Javelle, using the large equatorial of 760 mm. aperture, and M. Giacobini, using the equatorial *coudé* of 400 mm. aperture.

Comparing the observed apparent positions with the ephemeris positions ( $T = \text{September } 30.88$ ) given by M. Maubant in No. 4269 of the *Astronomische Nachrichten*, it is seen that the corrections to the latter are about  $-14\text{m.}$  and  $+1^{\circ} 24'$ . A further extract from the ephemeris is given hereunder:—

## Ephemeris 12h. M.T. Paris.

1908	$\alpha$ h. m.	$\delta$	$\log r$	$\log \Delta$
Oct. 20 ...	8 20.5 ...	+26 18.9 ...	0.0719 ...	9.8501
24 ...	8 32.7 ...	+25 13.2 ...	0.0762 ...	9.8524
28 ...	8 43.9 ...	+24 7.1 ...	0.0812 ...	9.8544
Nov. 1 ...	8 54.1 ...	+23 1.5 ...	0.0867 ...	9.8562

The positions determined at Nice are published in No. 4276 of the *Astronomische Nachrichten* (p. 61, October 9).

A BRIGHT METEOR.—Mr. Denning writes:—"I saw a conspicuous meteor on October 14 11h. 3m., =first magnitude, shooting exactly from  $\beta$  Andromedæ to between  $\beta$  and  $\eta$  Pegasi. Bright streak. The meteor was evidently an early Orionid, as the direction is from the usual radiant point at  $91^{\circ} + 15^{\circ}$ ."

"I think this well-known October shower continues from the 9th to the 29th of the month, and I have never been able to trace the slightest change of position in the radiant, though I have watched the display very closely with the special purpose of ascertaining whether or not any displacement occurs."

VORTICES IN THE SUN'S ATMOSPHERE.—In No. 10 of the *Comptes rendus* M. Deslandres discusses the "long flocculi," or filaments, shown on spectroheliograms in the neighbourhood of sun-spots and disturbed regions. From a study of the spectroheliograms taken at Meudon, combining the results obtained with the spectroheliograph with those obtained with an instrument indicating the radial velocities of the particular solar vapours observed, he arrives at the conclusion that the filaments are in reality *tourbillons* with horizontal axes, parallel to the solar surface. Six drawings, from photographs, accompany the paper, and show the extent and direction of some of these filaments on various dates. In some cases the actual filaments are accompanied by "alignments," and are continuations or sections of them, whilst in others similar alignments are shown alone. In general, the latter are

double and approximately parallel, including between the components an area a little less bright than the surrounding regions. These alignments generally intersect at faculic areas, and, if the latter be considered as cyclones having vertical axes, it is comprehensible that the former mark the lateral inrush of solar vapours to the cyclonic area. M. Deslandres considers that when the vertical movement is the more intense a spot is formed, and when the horizontal motion is the greater a dark filament, such as shown on Prof. Hale's recent photograph, results. He further urges the importance of a consistent research on these lines, and suggests that the results may prove valuable in the solution of problems relating to analogous movements in the terrestrial atmosphere.

THE ORBIT OF 42 COMÆ BERENICES ( $\Sigma$  1728).—New elements of the orbit of the binary system 42 Comæ Berenices are published in No. 4276 of the *Astronomische Nachrichten* (p. 55) by Dr. Doberck. This system is of special interest, as the apparent motion is in a straight line, the plane of the orbit lying in the line of sight. Dr. Doberck finds that the period is 25.335 years, and that the eccentricity of the orbit is 0.4965, the apparent length of the semi-major axis being  $0''.674$ .

THE RIO DE JANEIRO OBSERVATORY.—From the Minister of Industries we have received a copy of the "Annuario" published by the Rio de Janeiro Observatory for the current year. The volume contains a number of useful tables relating to astronomical and meteorological reductions, several calendars, tables for the conversion of measures from one system to another, and tables relating to cosmical physics, general physics, and chemistry.

## THE FIRST INTERNATIONAL CONGRESS ON REFRIGERATION.

IN an assembly which included ministers of railways and of agriculture, professors of physics, cold-storage engineers, fishery experts, fruit importers, and traffic managers, one naturally expected a very varied type of communication. A considerable portion of the available time was devoted to questions of such general importance as the settlement of units and the various legal matters in which cold storage, transport, and similar questions are getting involved. There were also a large number of purely scientific papers dealing with the production of cold, the determination of conductivity, and similar problems. Prof. H. K. Onnes gave, by special request, an account of his recent work on hydrogen and helium. He was followed by Prof. Mathias, who pointed out that, in the determination of the critical volume by his well-known straight-line law, substances did not follow, as a whole, the law of corresponding states. However, when divided up into groups, the correspondence was very perfect in the group. Prof. Onnes expressed the view that the divergencies must be ascribed to a difference of compressibility of the molecules themselves, or to a different distribution of potential round them. M. R. Pictet opposed strongly the view of ascribing an apparent volume to the molecules, and gave an interesting paper on the uses of low temperatures.

M. J. Becquerel communicated some of the results of the magneto-optic measurements he has made recently at Paris and Leyden. Particular interest was taken in the discovery of a phenomenon, resembling Zeeman's, in solutions and crystals. As a consequence, the section suggested that the nations should unite to construct a large electromagnet without iron to study such questions more effectively.

Oxygen is made from air in considerable quantities in Paris now by the Linde and the Claude processes. In principle there is not much difference, Linde employing pressures of about 60 kg. and Claude 20 kg. per sq. cm. There is a more economical distribution of pressure in the Claude method, a process which admits of the collection of nearly pure nitrogen. By an extension of the same method Claude is able to obtain neon and helium from the atmosphere, which is an interesting application of the principle of continuous fractional distillation for the purpose of obtaining what may be considered as traces of impurities.

It is arranged that an international bureau will be established for the purpose of regulating investigation and promoting uniformity in the methods of testing both machinery and products under the action of cold. The necessity of some such bureau was conclusively shown in the discussion on units. Certain people were desirous of introducing other than the C.G.S. units, and of stereotyping such units as the "frigorie" by a definition other than the present one of a negative calorie. It was felt, however, that these questions were too large for the section to discuss, and impossible for a full congress, so that they were left for the projected commission or bureau.

A question of prime importance in connection with the congress is that of a knowledge of the properties of the various non-conductors of heat used in practice. Up to the present most of the determinations published have been either on too costly materials or else on common materials in other conditions than those used in practice. The determination of coefficients of conductivity is one of no small difficulty, and an interesting review of various methods was given by Mr. W. D. A. Bost. A large series of careful measurements of the coefficients of conductivity of material in the form of thin plates has been made by M. A. Desvignes, using Lodge's modification of Forbes's method. Since the temperature coefficient for such bad conductors appears to be very small, the error introduced by applying such numbers to temperatures lower than the ordinary at which they were determined can only be one or two per cent. Much greater uncertainty is introduced owing to the different physical conditions of materials in practice, and also to the length of time before materials of considerable thickness really arrive at a steady state with regard to the flow of heat, and thus come into the condition in which the coefficients determined as above are applicable. From his own measurements Mr. G. Voorhees stated that as much as six days was necessary, even with thicknesses of the order of a decimetre, before the conductivity was proportional to the thickness. Again, nearly all non-conducting walls are composite, either being built up by bricks or slabs, or in several layers with an air space between, or both combined. The conductivity is thus much more complicated, and it is very questionable whether any satisfactory conclusions could be arrived at without more complete investigation on these various questions.

On the production of cold there were several interesting papers describing the various methods used and summing up their efficiency.

New elements were introduced by the description of a novel rotating machine using sulphur dioxide, invented by M. Singrün. In this machine the outside of the hermetically closed condenser is kept in continual rotation, the inner parts being hung and kept in place by their weight. Some small machines were in actual work, and certainly produced ice very rapidly and easily with an apparently small consumption of power; but no figures were given or indicators used to show exactly what was happening. There seems no doubt that the principle is new and most useful for small machines, as there is little lubrication and no taps to get out of order. In the case of the usual compressors, considerable economy can be gained by the use of the multiple-effect method. In this case the same cylinder is used for two or more pressures at the same stroke by a proper system of ports and connections. The result is that the usual indicator diagram, which has a very sharp peak, for such machines, is much broadened there, and the same plant has thus a considerably higher working value.

The sections devoting themselves to the application of refrigeration to food were concerned with the construction of cold stores of all descriptions, about which there was nothing of general interest. The effect of different degrees of cold and humidity is being studied very carefully by the United States Department of Agriculture, and some of the results were given by Miss E. Pennington. Experiments on chickens varied in length from a few hours to four years, both on chickens bought in the open market and with those the history of which was known. It was found that, as would be expected, the various bacilli were more numerous in the former class, and their numbers appeared to increase up to about a year, and then to decrease. Even at the end

of four years there were some living. These long periods are not often employed in practice, about five months being the average at present. Very interesting photomicrographs were exhibited showing the gradual breaking down of the muscles, owing to the intrusion of foreign matter which increased with the time. In some cases the breakage was sharply at right angles to the muscle, which rendered the material very brittle. The material was also examined chemically, the changes which occurred being much greater in the open market class, and all tend to prove that the action is due to enzymes and not to bacteria. The loss of water, though great, was not of any dietetic importance, though it would affect the commercial value, but this might be controlled to a large extent.

One interesting point was the occurrence of mould at the end of very long terms. There seemed no reason to suppose that the mould had appeared after removal from the cold store, as the time was so short before examination. This is important in connection with the present position of the authorities in England and France with regard to moulds, those on rabbits and meat being assumed to render them unfit for food, while they are allowed on hams, &c.

Similar investigations on a less elaborate scale, with other food-stuffs and either frozen ( $-9^{\circ}$  C. to  $-12^{\circ}$  C.) or chilled ( $-1^{\circ}$  to  $-2^{\circ}$  C.), were given by other investigators. The results point to the necessity of finding the most suitable temperature for each material and of care in thawing, and also of using pure water for this proceeding. Under modern conditions and for reasonable times, there seems to be no appreciable decrease in the nutritive effects of food materials due to refrigeration; in fact, many harmful parasites are less likely to be present in frozen than in unfrozen meat and other foods.

In the production of flowers for market it is of great advantage to be able to have them as early as possible. It appears that in many cases the time of flowering can be advanced nearly two months by checking the foliage at a critical time. The investigations are only in their infancy, but promise very important results.

The use of dry air is of importance in many industries at the present time, and the employment of considerable cold appears to be the most convenient and economical means of obtaining it. This is markedly the case in the production of pig-iron in the blast-furnace, where the usual amount of humidity in the air leads to a considerable loss. It is said that by reducing the humidity to 6 grains per cubic foot, an increase of output of 26.4 per cent. and a saving of fuel of 13.4 per cent. has been obtained.

In the section devoted to legislation it became clear how extremely important it now is to have united effort in refrigeration matters, and its great importance to the British Empire was emphasised. In view of this importance it is remarkable, and entirely characteristic, that the British Government, in marked distinction to other countries, paid no attention to the congress.

In addition to the sectional meetings, congress lectures were given by Profs. von Linde and d'Arsonval. The former enlarged on the use of cold in dwelling houses, and took as his text the saying that the use of cold would advance civilisation in the tropics in a manner similar to that in which the temperate regions had been advanced by the employment of means of heating. Prof. d'Arsonval lectured on the science and industry of cold, reviewing our present position, and in this way closed a successful congress, in which nearly 4000 people, drawn from the whole world, took part.

It was decided to hold the next congress at Vienna in 1910, after which they will be triennial.

#### LOCAL ASSOCIATIONS FOR PROMOTING EUGENICS.<sup>1</sup>

I PROPOSE to take the present opportunity of submitting some views of my own relating to that large province of eugenics which is concerned with favouring the families of those who are exceptionally fit for citizenship. Consequently, little or nothing will be said relating to what has been well termed by Dr. Saleeby "negative" eugenics, namely, with hindering the

<sup>1</sup> Address to a meeting of the Eugenics Education Society at the Grafton Galleries, on October 14, by Francis Galton, F.R.S.